



Energy Efficiency Directive (EED) and its impact on CHPQA

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Energy Efficiency Directive “2012/27/EU”

High-efficiency Cogeneration shall fulfil the following (see Annex II):-

- Units with generating capacity ≥ 1 MWe to deliver **Primary Energy Savings (PES) of at least 10%**
- Units with generating capacity < 1 MWe to **deliver PES $> 0\%$**
- When compared with the **harmonised efficiency reference values** for separate generation of electricity and heat
- These reference values are developed by the Commission, to represent the **best available cost effective technologies**.



Efficiency Reference Values

- These reference values (for separate generation of heat and electricity) are reviewed every 4 years.
- First in 2007, second in 2011 and
- The latest review was undertaken in 2015
- The revised Reference Values were published as Commission Delegated Regulation (EU) 2015/2402 in December 2015
- They apply from January 2016



Key results of review

➤ **Changes to the Fuel List**

- Total of 18 categories: 6 solid, 3 liquid, 4 gas and 5 other,
- New fuel categories were added (e.g. nuclear, solar thermal, geothermal),
- Waste heat (including high temperature process exhaust gases and heat from exothermic chemical reactions) was presented as a standalone category,
- The 'Wood fuels' and 'Agricultural biomass' categories were renamed as 'Dry biomass' and 'Other solid biomass',



Key results of review

➤ Changes to some electrical reference efficiency

- Most categories were **kept at the same reference** electrical efficiency,
- Natural gas went up from **52.5% to 53%**,
- ‘Dry biomass’ (previously wood fuels) went up from **33% to 37%**,
- ‘Other solid biomass (previously agricultural biomass) went up from **25% to 30%**,
- Waste liquid (covering biodegradable and non-renewable waste) went up from **25% to 29%**,
- Nuclear set at 33% and geothermal at 19.5%,
- Waste heat and solar thermal set at 30%



Reference Values for Electricity

Category		Type of fuel	Year of construction		
			Before 2012	2012-2015	From 2016
Solids	S1	Hard coal including anthracite, bituminous coal, sub-bituminous coal, coke, semi-coke, pet coke	44.2	44.2	44.2
	S2	Lignite, lignite briquettes, shale oil	41.8	41.8	41.8
	S3	Peat, peat briquettes	39.0	39.0	39.0
	S4	Dry biomass including wood and other solid biomass including wood pellets and briquettes, dried woodchip, clean and dry waste wood, nut shells and olive and other stones	33.0	33.0	37.0
	S5	Other Solid Biomass including all wood not included under S4 as well as black and brown liquor	25.0	25.0	30.0
	S6	Municipal and industrial waste (non-renewable) and renewable/bio-degradable waste	25.0	25.0	25.0
Liquids	L7	Heavy fuel oil, gas/diesel oil, other oil products	44.2	44.2	44.2
	L8	Bio-liquids including bio-methanol, bioethanol, bio-butanol, biodiesel, other bio-liquids	44.2	44.2	44.2
	L9	Waste liquids including biodegradable and non-renewable waste (including tallow, fat and spent grain)	25.0	25.0	29.0
Gaseous	G10	Natural gas, LPG and LNG and biomethane	52.5	52.5	53.0
	G11	Refinery gases hydrogen and synthesis gas	44.2	44.2	44.2
	G12	Biogas produced from anaerobic digestion, landfill, and sewage treatment	42.0	42.0	42.0
	G13	Coke oven gas, blast furnace gas, mining gas, and other recovered gases (excluding refinery gas)	35.0	35.0	35.0
Other	O14	Waste heat (including high temperature process exhaust gases and product from exothermic chemical reactions)	-	-	30.0
	O15	Nuclear	-	-	33.0
	O16	Solar thermal	-	-	30.0
	O17	Geothermal	-	-	19.5
	O18	Other fuel not mentioned above	-	-	30.0



Impact on CHPQA

- The reference values are incorporated within the CHPQA QI formulae X and Y coefficients
- The CHPQA Standard was revised in 2007 to incorporate changes to the reference values.
- In 2011 there were no changes to the reference values
- The 2015 EU review has resulted in a number of changes
- Following a stakeholder engagement exercise earlier this year, the **CHPQA Standard and GN44 have now been revised and published (both as Issue 6)** to ensure consistency with the new EU reference values going forward.
- **The new QI formulae only apply to new Schemes (F3 from 1 Jan 2016 and new F4 from 1 Jan 2017).**



Implementation: X and Y values

- The new X and Y values will apply to all new Schemes that receive an F3 or F4 certificate on or after 1st January 2017, where they have not been certified (F3 or F4) prior to 1st January 2016.
- Schemes that receive an F3 certificate for the first time between 1st January and 31st December 2016 on the basis of existing X and Y values will have the new X and Y values applied to them from 1st January 2017.
- Schemes that received an F4 certificate for the first time between 1st January and 31st December 2016 will be treated as **existing Schemes and their X and Y values will be grandfathered.**
- **Existing Schemes** that received an F3 or F4 certificate prior to 1st January 2016 on the basis of existing X and Y values will continue to be certified on those values going forward (i.e. **be 'grandfathered'**).



CHPQA Standard (Issue 6) Definitions

Size of Scheme (CHP _{TPC})	QI Formula
CONVENTIONAL FOSSIL FUELS SCHEMES	
Natural gas	
≤1MWe	QI = 249 x η_{power} + 113 x η_{heat}
>1 to ≤10MWe	QI = 195 x η_{power} + 113 x η_{heat}
>10 to ≤25MWe	QI = 191 x η_{power} + 113 x η_{heat}
>25 to ≤50MWe	QI = 186 x η_{power} + 113 x η_{heat}
>50 to ≤100MWe	QI = 179 x η_{power} + 113 x η_{heat}
>100 to ≤200MWe	QI = 176 x η_{power} + 113 x η_{heat}
>200 to ≤500MWe	QI = 173 x η_{power} + 113 x η_{heat}
>500MWe	QI = 172 x η_{power} + 113 x η_{heat}
Oil	
≤1MWe	QI = 249 x η_{power} + 115 x η_{heat}
>1 to ≤25MWe	QI = 191 x η_{power} + 115 x η_{heat}
>25MWe	QI = 176 x η_{power} + 115 x η_{heat}
Coal	
≤1MWe	QI = 249 x η_{power} + 115 x η_{heat}
>1 to ≤25MWe	QI = 191 x η_{power} + 115 x η_{heat}
>25MWe	QI = 176 x η_{power} + 115 x η_{heat}
SPECIAL CASES	
FUEL CELL SCHEMES	
	QI = 180 x η_{power} + 120 x η_{heat}
ALTERNATIVE FUEL SCHEMES	
Category A (e.g. AD gas, sewage gas, landfill gas)	
≤1MWe	QI = 238 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 225 x η_{power} + 120 x η_{heat}
>25MWe	QI = 182 x η_{power} + 120 x η_{heat}
Category B (e.g. synthesis gas)	
≤1MWe	QI = 275 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 223 x η_{power} + 120 x η_{heat}
>25MWe	QI = 191 x η_{power} + 120 x η_{heat}
Category C (e.g. fatty acid methyl ester, pyrolysis oil etc.)	
≤1MWe	QI = 226 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 191 x η_{power} + 120 x η_{heat}
>25MWe	QI = 171 x η_{power} + 120 x η_{heat}
Category D (e.g. tallow, used cooking oil)	
≤1MWe	QI = 226 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 226 x η_{power} + 120 x η_{heat}
>25MWe	QI = 171 x η_{power} + 120 x η_{heat}
Category E (e.g. municipal waste, sewage sludge, paper sludge etc.)	
≤1MWe	QI = 370 x η_{power} + 120 x η_{heat}
>1 to ≤10MWe	QI = 370 x η_{power} + 120 x η_{heat}
>10 to ≤25MWe	QI = 364 x η_{power} + 120 x η_{heat}
>25MWe	QI = 220 x η_{power} + 120 x η_{heat}

Size of Scheme (CHP _{TPC})	QI Formula
ALTERNATIVE FUEL SCHEMES	
Category F (e.g. logs, energy crops, agricultural residues etc.)	
≤1MWe	QI = 346 x η_{power} + 120 x η_{heat}
>1 to ≤10MWe	QI = 347 x η_{power} + 120 x η_{heat}
>10 to ≤25MWe	QI = 303 x η_{power} + 120 x η_{heat}
>25MWe to ≤50MWe	QI = 220 x η_{power} + 120 x η_{heat}
>50MWe	QI = 196 x η_{power} + 120 x η_{heat}
Category G (e.g. contaminated waste wood)	
≤1MWe	QI = 346 x η_{power} + 120 x η_{heat}
>1 to ≤10MWe	QI = 331 x η_{power} + 120 x η_{heat}
>10 to ≤25MWe	QI = 303 x η_{power} + 120 x η_{heat}
>25MWe to ≤50MWe	QI = 214 x η_{power} + 120 x η_{heat}
>50MWe	QI = 191 x η_{power} + 120 x η_{heat}
Category H (e.g. wood pellets, straw, clean waste wood etc.)	
≤1MWe	QI = 329 x η_{power} + 120 x η_{heat}
>1 to ≤10MWe	QI = 291 x η_{power} + 120 x η_{heat}
>10 to ≤25MWe	QI = 284 x η_{power} + 120 x η_{heat}
>25MWe to ≤50MWe	QI = 214 x η_{power} + 120 x η_{heat}
>50MWe	QI = 191 x η_{power} + 120 x η_{heat}
Category I (e.g. by-product gases produced in industrial processes)	
≤1MWe	QI = 294 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 221 x η_{power} + 120 x η_{heat}
>25MWe	QI = 193 x η_{power} + 120 x η_{heat}
Category J (e.g. waste gases such as carbon monoxide, or waste heat such as the exhaust gas from high temperature processes, or as a product of exothermic chemical reactions).	
≤1MWe	QI = 329 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 299 x η_{power} + 120 x η_{heat}
>25MWe	QI = 193 x η_{power} + 120 x η_{heat}
Category K (e.g. non-renewable liquid waste)	
≤1MWe	QI = 275 x η_{power} + 120 x η_{heat}
>1 to ≤25MWe	QI = 260 x η_{power} + 120 x η_{heat}
>25MWe	QI = 171 x η_{power} + 120 x η_{heat}

- For New Schemes that received a first F3 after 1 January 2016, or
- For New Schemes that received a first F4 after 1 January 2017